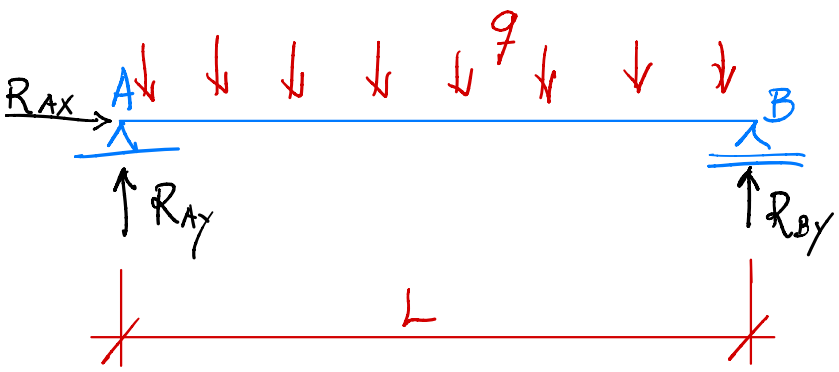
Example: Simply supported beam

Objectives: Familiarize ourselves with the “qL^2/8 parabola” and establish the results that are given on the formula sheet for CIVL 332.



Reactions:

$$\sum M_A = (q \cdot L)\frac{L}{2} - R_{BY} \cdot L = 0$$

$$\Rightarrow R_{BY} = \frac{qL}{2}$$

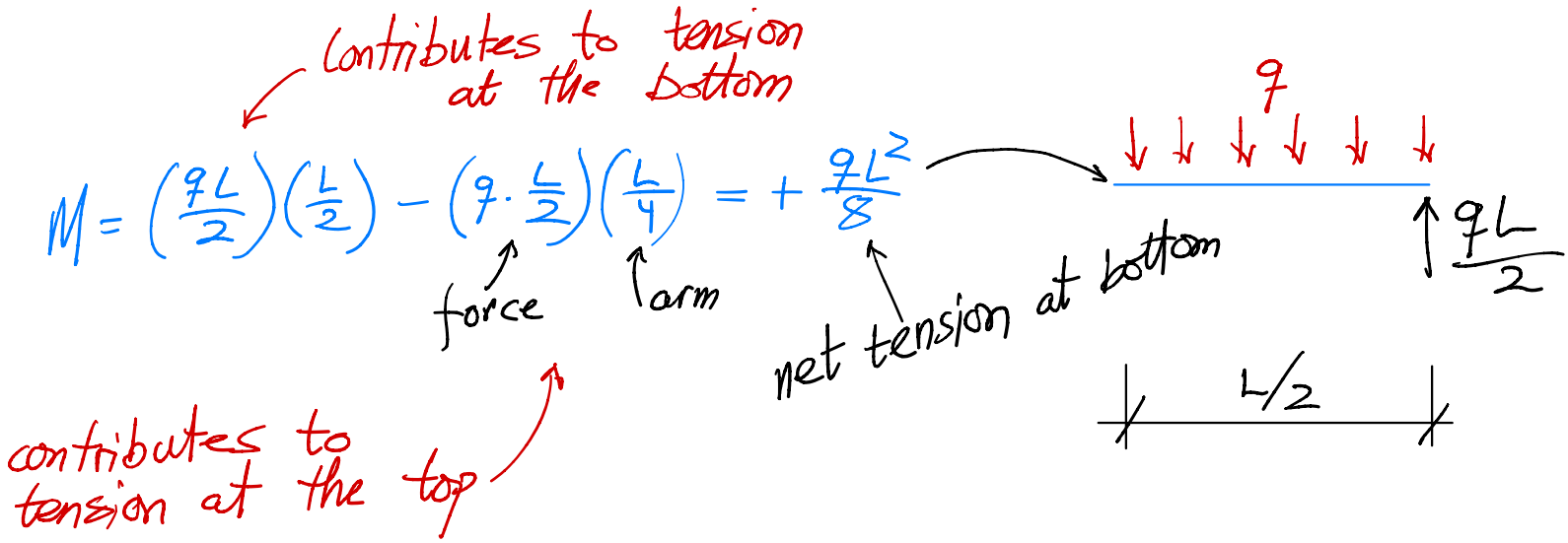
$$\sum F_y = R_{AY} + R_{BY} - q \cdot L = 0$$

$$\Rightarrow R_{AY} = \frac{qL}{2}$$

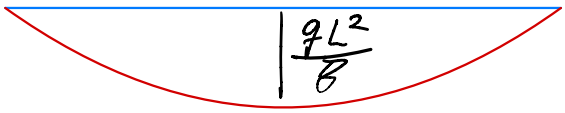
$$\sum F_x = R_{AX} = 0$$

We know that the bending moment is zero at both ends, because the beam ends at a pin and a roller.

So, the “key location” to determine the bending moment is at mid-span:



BMD:



← Drawn on tension side

In this course, we want to make sure that we know how to get the shear force diagram from the bending moment diagram. In other words, we want to be able to go from the SFD to the BMD. After you read this page, for the rest of the course, you can simply see the SFD that corresponds to a parabolic BMD from the formula sheet. But here is how that result was obtained:

The relationship between the BMD and the SFD is V=dM/dx. For that reason, one way to obtain the SFD is to formulate the mathematical function for M(x) and differentiate it to obtain V(x). However, you can also just recognize that the shear force, by equilibrium, is qL/2 at both ends of the beam. Regardless of how you look at it, this is the result: